



# **Environmental Impacts of Tobacco Product WASTE**

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## Tiny Trash





SAN DIEGO STATE  
UNIVERSITY



# Campus Butt Cleanup



**>20,000 Butts !**



## Butts and the Environment

- Tobacco product waste is 30-40% of all debris items collected from beaches, rivers and streams on annual cleanup days
- 5.5 trillion cigarettes are consumed globally every year;
- Of these, 4.95 trillion are filtered, deposited somewhere in the environment worldwide
- Up to 65% of all butts discarded improperly
- Number one item collected on International Beach Cleanup annually since 1996



Biodegradation varies under different conditions. For example, salt water (oceans) slows down the degradation process. Tobacco company-sponsored research often uses aggressive composting methods to show that filter degrade. The ICC states that filters degrade in 1-5 years under ideal conditions. CA is classified as a plastic though, and plastics are subject to photodegradation, not biodegradation. The Victorian Litter Action Alliance give the following statistics (<http://www.litter.vic.gov.au/www/html/162-cigarette-butt-litter-statistics.asp>):

- 1-2 months in aerobic (with air) conditions
- 6-9 months in anaerobic (without air) conditions
- 12 months in fresh water
- 36 months or longer in sea-water (Clean Up Australia 1997; NSW EPA 2001)

A Japanese study found hardly any degradation (scd95c00).



## Top Ten Items Picked Up Over 27 Years of Coastal Cleanup

Item rank	Item	No. of Debris Items	Percentage of Total Debris Items
1	<b>cigarettes/filters</b>	<b>52,907,756</b>	<b>32%</b>
2	food wrappers/containers	14,766,533	9%
3	caps, lids	13,585,425	8%
4	cups, plates, forks, knives, spoons	10,112,038	6%
5	beverage bottles (plastic)	9,549,156	6%
6	bags (plastic)	7,825,319	5%
7	beverage bottles (glass)	7,062,199	4%
8	beverage cans	6,753,260	4%
9	straws/stirrers	6,263,453	4%
10	rope	3,251,948	2%
Top ten total debris items		<b>132,077,087</b>	<b>80%</b>
Total debris items worldwide		<b>166,144,420</b>	<b>100%</b>

Source: Ocean Conservancy, 2011

## **Butts on the Beach: More than a public nuisance?**



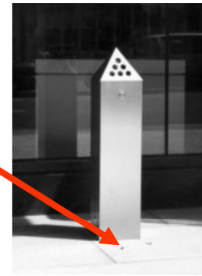
# Clean Indoor Air Policies Increase Urban Butt Waste



With rain, butts are carried via stormwater directly into harbors, beaches and rivers



**Bad aim!**



## **Environmental Toxicity**

- Aquatic ecosystems, such as shorelines and waterways, are most vulnerable, as majority of land-based waste is deposited in these environments.
- Cigarette butt leachates are hazardous toxic waste
  - Contain measureable heavy metals such as cadmium, arsenic and lead;
  - Acutely toxic to freshwater micro-organisms
  - Main cause probably nicotine and ethylphenol

# The Problem with Filters



*Photo copyrighted by Chris Register,  
Clean Virginia Waterways*

- Made of cellulose acetate, a non-biodegradable plastic
- Cigarette filters are specifically designed to accumulate particulate smoke components including toxic chemicals....that leach out into the environment

## Filter Waste Degradation

- Varies under different conditions.
  - salt water slows degradation process.
  - 1-5 years under ideal conditions.
  - Plastics such as cellulose acetate may photo-degrade, but not biodegrade.
- Examples
  - 1-2 months in aerobic conditions
  - 6-9 months in anaerobic conditions
  - 12 months in fresh water
  - 36 months or longer in sea-water
  - Japanese study found little degradation.

## **Environmental Effects of Cigarette Butt Waste**

- Environmental toxicity
  - Leachates
  - Sediment contamination
  - Bottom feeding fish, sea birds, turtles, pets, and other animals may consume
  - Toxic to Daphnia and microtox organisms
- Environmental degradation/nuisance
- Economic cleanup costs to communities

# The Fish Toxicity Study

Topsmelt- Marine



Fathead Minnow- Freshwater



Photos:  
Elli Slaughter, MPH  
(2010)

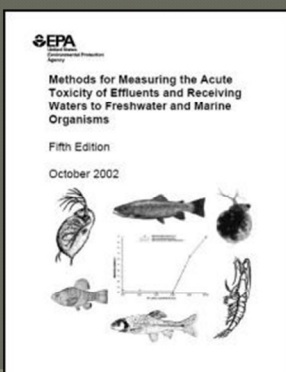


# Acute Toxicity Testing

## Marine and Freshwater Fish

- **EPA-821-R-02-012:** Standard EPA protocol for acute testing with marine and freshwater organisms

- **Length:** 96 hours
- **Endpoint:** Survival



**Smoked**  
cigarette  
filters +  
tobacco



**Smoked**  
cigarette  
filters



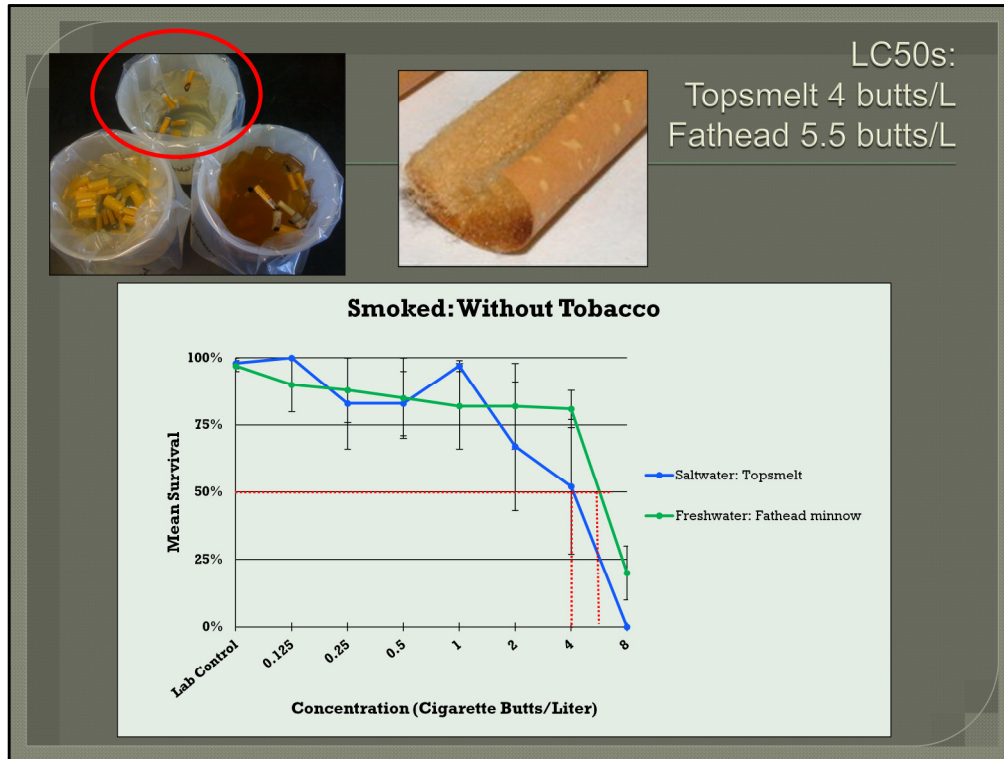
**Unsmoked**  
cigarette  
filters





LC50 for both species = 1

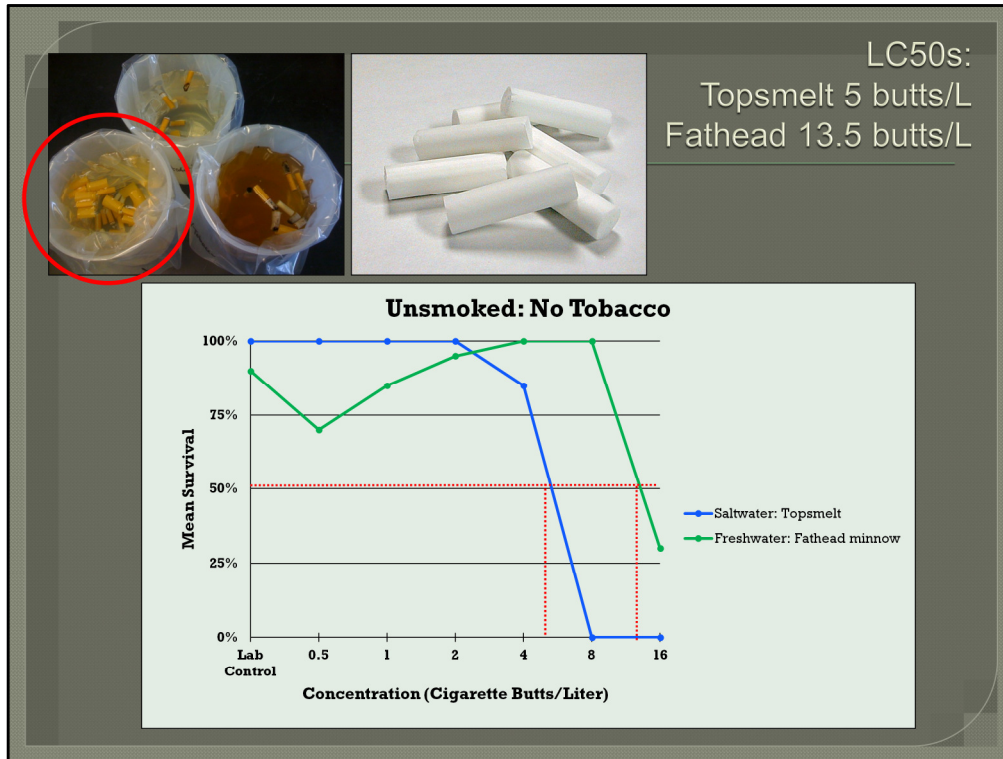
This LC50 is between 13 and 30 times greater than the LC50 previously reported for cladocera, but it is in line with the LC50 previously reported for marine bacteria, so, while it's still toxic, fish and marine bacteria appear to be much less sensitive to this leachate than cladocera.



Topsmelt LC50 = 3-4 (2.67 – 4.6)

Fathead LC50 = 5.5

These LC50s are 4-5 times greater than the LC50 reported by the previous study, so, once again fish appear to be less sensitive to this leachate than cladocera



LC50 topsmelt = 5.1

LC50 fatheads = 13.5

The previous study to test this type of leachate could only report an LC50 of >16 butts/L. So clearly these LC50s are lower than that, and fish would appear to be more sensitive to this type of leachate than cladocera.

## Machine-smoked, with Tobacco



## Additional Health Issues

- SUBLETHAL EFFECTS: adverse effects on growth, development, or reproduction
- BIOACCUMULATION and BIOAMPLIFICATION;
- SPECIFIC CHEMICALS that are lethal are unknown.



## Health Effects??

**>100 billion dumped in US alone each  
year**



Photo: Dr. Dawn Ruben



Photo Courtesy of 'No Butts Left Behind Project'  
Santa Barbara Tobacco Control Program

## Potential Pathways: Butt Waste to Human Health Risks

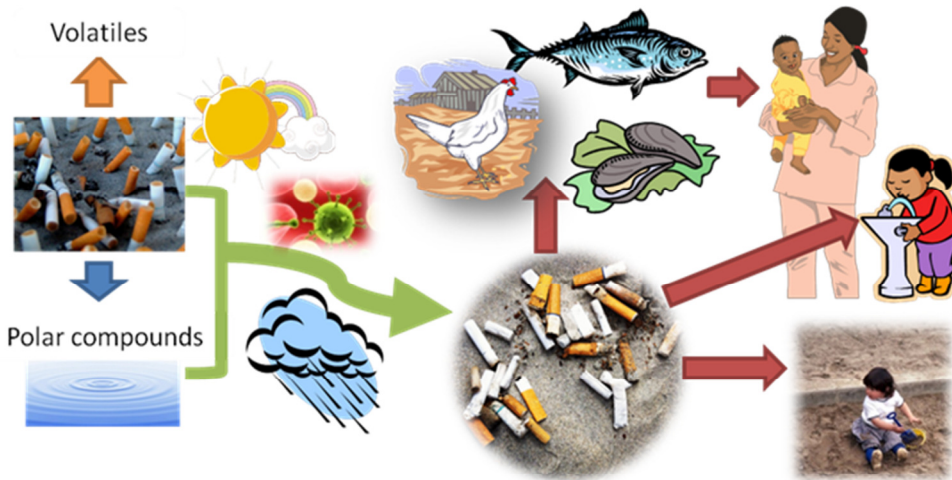
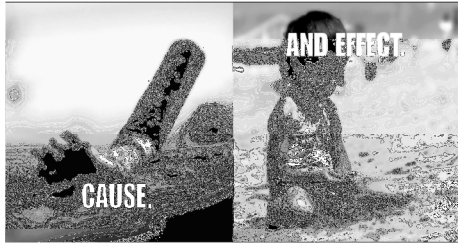


Image courtesy of Eunha Hoh, 2011

## Accidental Poisonings of Humans and Animals



*Erase the Waste Campaign, CA Water Boards*

- Ingestion by small children: 4400 Cases reported by poison centers from 2002-2007
- Seabirds, turtles and some fish ingest butts;
- Butts may swell in the stomach—false satiation and starvation;
- Animal poison control centers reported 848 cases of butt ingestion by pets, 2005-2010.



“In Ireland where the smoking ban is already in place more than 60 per cent of people think the ban has led to a rise in cigarette rubbish.” (Beaven, March 2006. <http://www.insidepublic.co.uk/default.aspx?contentid=cf25e17c-a401-4aa2-83fc-f6403459e099&newsid=1447097>)

## Summary

- Butts are not just litter: they are a toxic waste product needing regulation;
- Butt waste
  - damages habitat, landscapes and ecosystems;
  - ignites destructive, deadly fires;
  - poisons wildlife and children;
  - consumes tax dollars for cleanup and disposal; and lasts forever!

## **And More...**

- Filters are not biodegradable;
- The tobacco industry tries to avoid responsibility for take-back, prevention, and end-of-product-life effects and nuisance;
- Reframing of butt as toxic waste and raising awareness are needed to develop UPSTREAM policy interventions.

## **Actions to Prevent Butt Waste**

- Change social norms on butt flicking
- Ban smoking in parks, beaches, and other outdoor spaces: bars, restaurants, worksites
- Add litter fee to price of cigarettes
- Add take-back scheme to cigarette market structure
- Change the product to be less of a hazard
- Consider litigation

# CIGWASTE.ORG



Photo: Courtesy of Surfers Against Sewage, UK